Networking Standards

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ABSTRACT

The enterprise network is currently a multivendor environment consisting of many defacto and proprietary standards. During the 1990s, these networks will evolve towards networks which are based on international standards in both the LAN and WAN space. Also, you can expect to see the higher level functions and applications begin the same transition.

The Open Network Advantage

Market Requirements

OPEN NETWORKS!!!

- **Multi-protocol, multi-platform, multi-vendor networks working together**
- **International AND defacto standards**
- **Effortless communications within and between enterprises**
- **Ability to move to standards at own pace**

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What is an Open System?

Defined as:

A vendor–neutral computing environment:

- **compliant with International and defacto standards**
- **permits system and network interoperability or software applications portability**
- **includes consistency of data and human access**
- **satisfies one or more of a business's functional requirements**

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Standards

Benefits from networks based on international and defacto standards

- Vendor independence
- Applications portability
- Investment protection
- Improved communications leading to increased productivity
- Network flexibility

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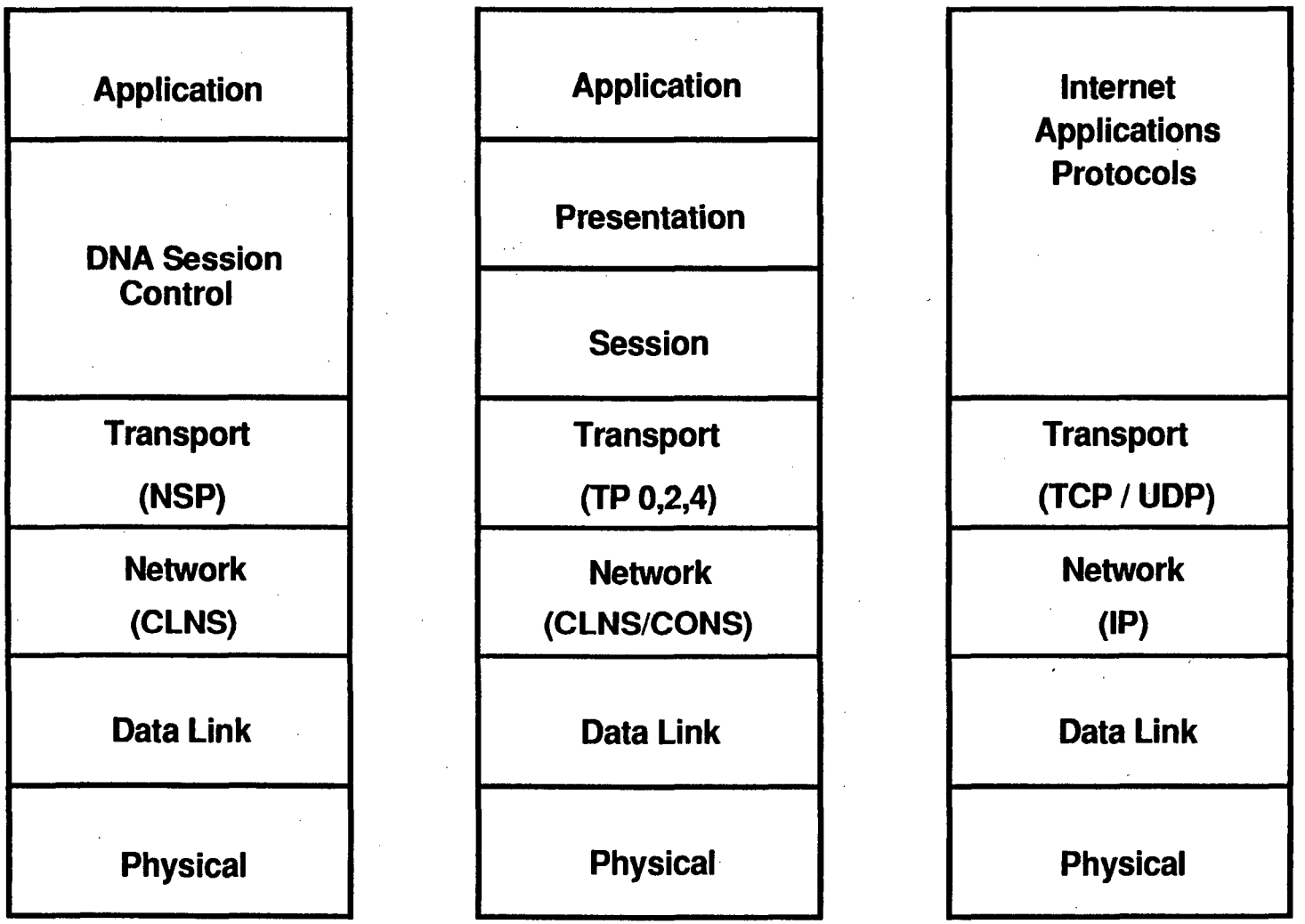
Network Architectures: DECnet, OSI, TCP/IP



What is TCP/IP?

- o a.k.a. ----> The Internet Protocol Suite
- o In use since late 1970s
- o Developed for Advanced Research
  Project Agency Network (ARPANET)
- o Used to allow interaction of many private ARPA
  subnetworks in government and research
- o Inclusion with Berkeley UNIX
  encouraged rapid growth
- o Growth of UNIX-based workstations
  and multivendor networking,
  in lieu of OSI,
  insures a long life for TCP/IP

The Internet Protocols

- Physical/Datalink (Ethernet, X.25)
- Network Layer
  - -- Internet Protocol (IP)
  - -- Internet Control Message Protocol (ICMP)
  - -- Address Resolution Protocol (ARP)
  - -- Internet Gateway
- Transport Layer
  - -- Transmission Control Protocol (TCP)
  - -- User Datagram Protocol (UDP)
- Applications Layer
  - -- Simple Mail Transfer Protocol (SMTP)
  - -- File Transfer Protocol (FTP)
  - -- Virtual Terminal (TELNET)
  - -- Network File System (NFS)

The Internet Protocols (TCP/IP)

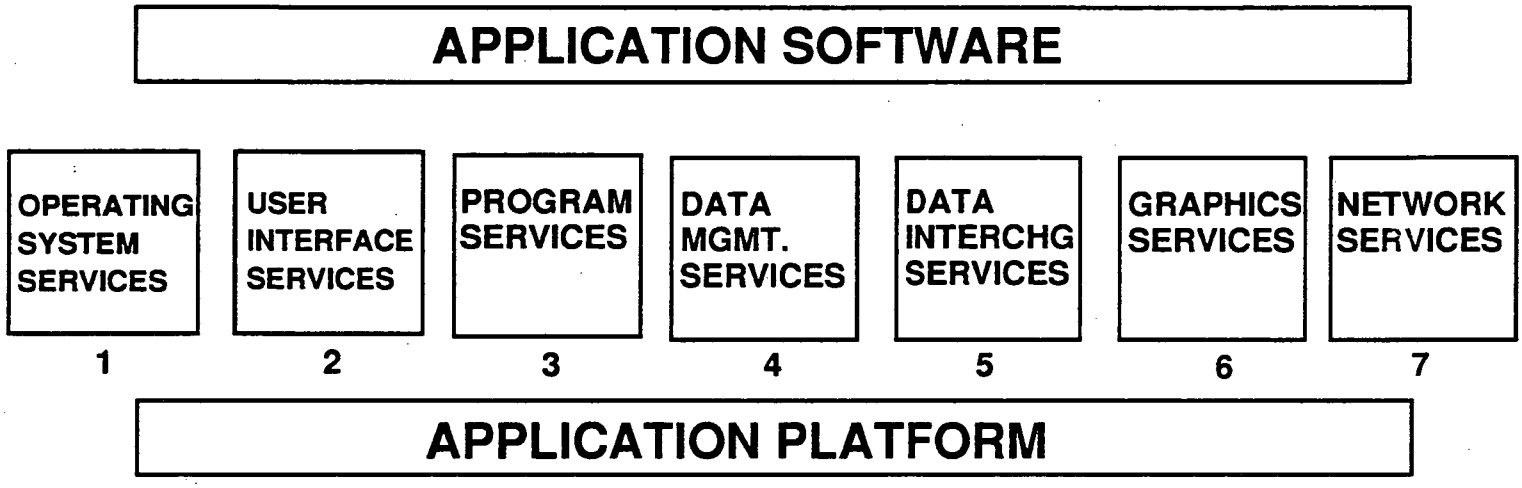
7 – Application	FTP	telnet	SMTP	r–Commands
6 – Presentation	XDR			
5– Session	RPC			
4 – Transport	TCP		UDP	
3 – Network	IP			
2 – Data Link	Ethernet / Point–to–Point			
1 – Physical	Ethernet / Point–to–Point			

What is OSI?

- o Emerging technology
- o a.k.a. ----> Open Systems Interconnection
- o A layered network architecture
  based on a seven-layer model
- o Developed by the International Organization
  for Standardization (ISO)
- o OSI defines the standards for communications
  between open systems on a global scale
- o Supported by governments and major computer
  vendors (Digital, IBM, HP,
  Sun, UNISYS, Siemans, etc)
- o Required by Government OSI Profiles (GOSIP)
- o Foundation for global addressing and
  new distributed applications (EDI)

GOSIP in the Open Systems Enviroment

Elements of a standards based "Open System" :

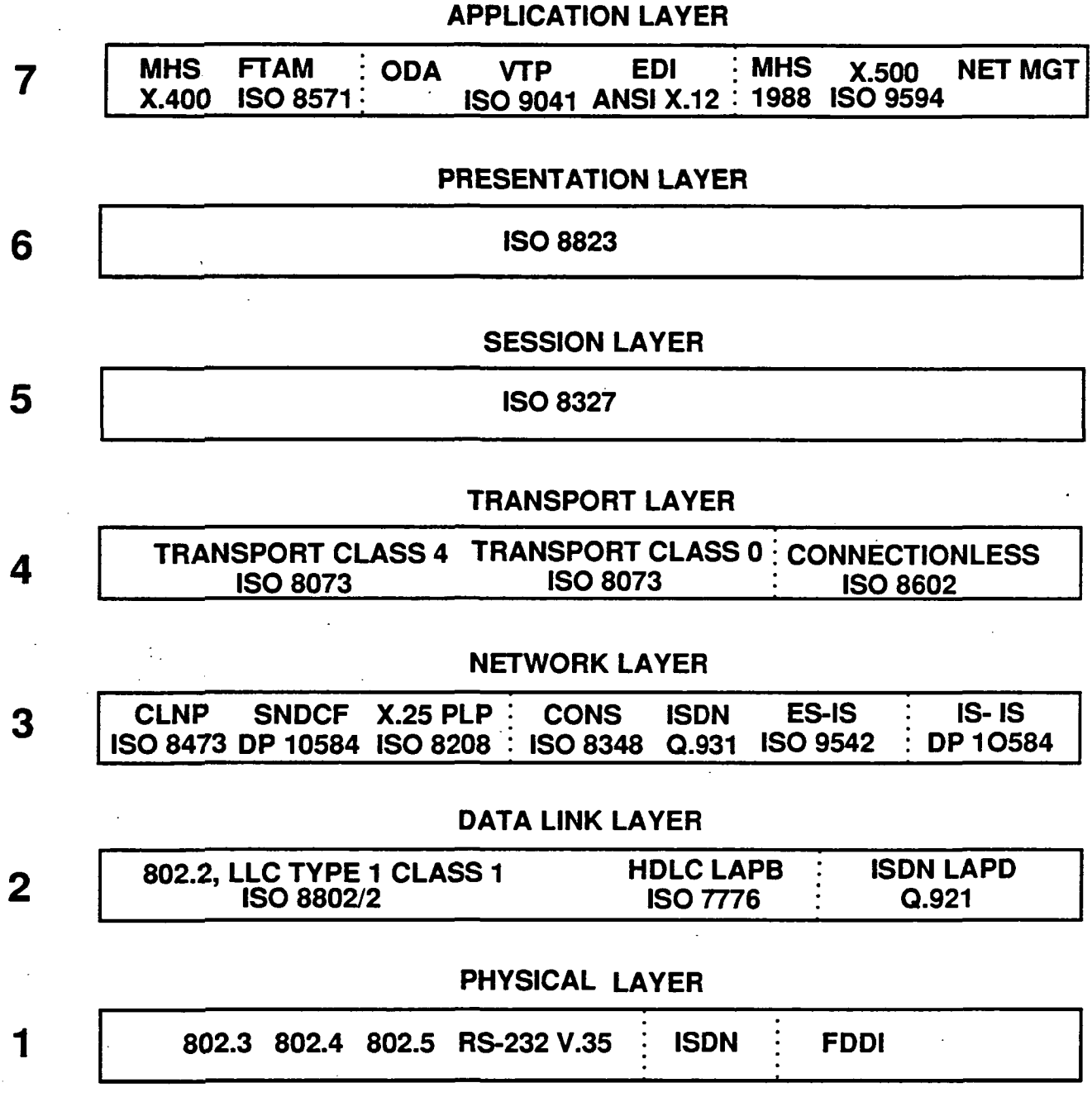


1. POSIX.1, POSIX.2, GNMP, POSIX.6
2. FIPS 158 - X Window System
3. Ada, C, COBOL, FORTRAN, PASCAL, PCTE+, SCCS
4. IRDS (Data Dict/Dir Component), SQL, RDA
5. ODA/ODIF, SGML, CGM, IGES, STEP
6. GKS, PHIGS
7. FIPS 146 - GOSIP

U.S. GOSIP STANDARDS BASED APPLICATIONS

SERVICES OFFERED:	STANDARDS:
CORPORATE MESSAGING	X.400/EDI
FILE TRANSFER	FTAM
VIRTUAL TERMINALS	VTP
USER INTERFACES	X WINDOWS/MOTIF
DIRECTORY SERVICES	X.500
TRANSACTION PROCESSING	ISO TP
REMOTE PROCEDURE CALLS	RPC
APPLICATION PORTABILITY	X/OPEN
INTER-NETWORK	ISO IS - IS (DP 10584) ISO ES - IS (ISO 9542)
LOCAL AREA NETWORK	ISO 8802
OFFICE AUTOMATION	ODA/ODIF
CIM	MMS/MAP

U.S. GOSIP Standards Based System Elements



U.S. GOSIP Version 1.0

Requirements Summary:

- Issued January 1989 as FIPS-146

- Mandatory in RFPs as of August 1990

- FTAM- Phase 2

  - Limited Purpose
    T1 Simple File Transfer
    M1 Management

  - Full Purpose
    T2 Positional File Access
    A1 Simple File Acess
    M1 Management

  - Initiator/responder, Sender/Receiver

  - Transport Protocol Class, Connectionless Network Service

- MHS

  - CCITT X.400 MHS 1984

  - P1, P2

  - TP 0, CONS, X.25 or TP4, CLNS

U.S. GOSIP Version 2.0

Requirements Summary:

- Issued March 1991 Revision to FIPS 146

- Mandatory in RFPs as of October 1992

- FTAM Phase 2

  - Full Purpose

    T1,T2 Simple, Positional File Access
    A1 Simple File Access
    M1 Management
    FTAM 1,2,3 Document Types
    Initiator/Resonder, Sender/Receiver

- VTP
  - Telnet
  - Forms (optional)
  - TP4, CLNS

- MHS
  -CCITT X.400 MHS 1984
  - P1,P2
  - TP 0, CONS, X.25 or TP4, CLNS

- Office Document Architecture

Summary
Protocols

OSI Model	Internet	DECnet	OSI
Application	FTP TELNET SMTP	DAP CTERM MAIL11	FTAM VTP X.400
Presentation			
Session			
Transport	TCP UDP	NSP —	TP4 TP0, CLTS
Network	IP ICMP, ARP	Routing Routing	CLNP, IP ESIS
Data Link	Ethernet		
Physical			

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Coexistence and Transition Techniques

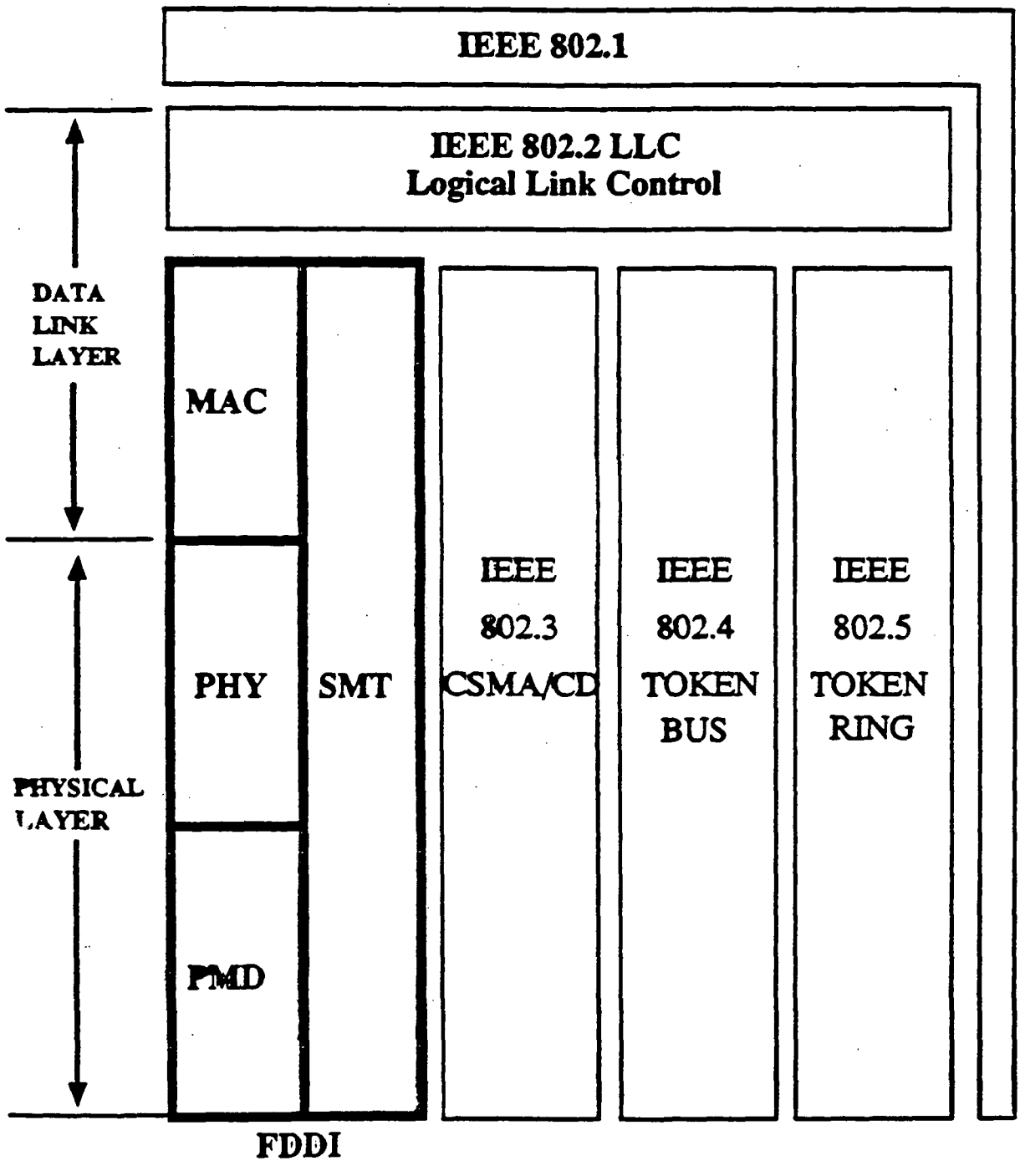
Protocol Based:

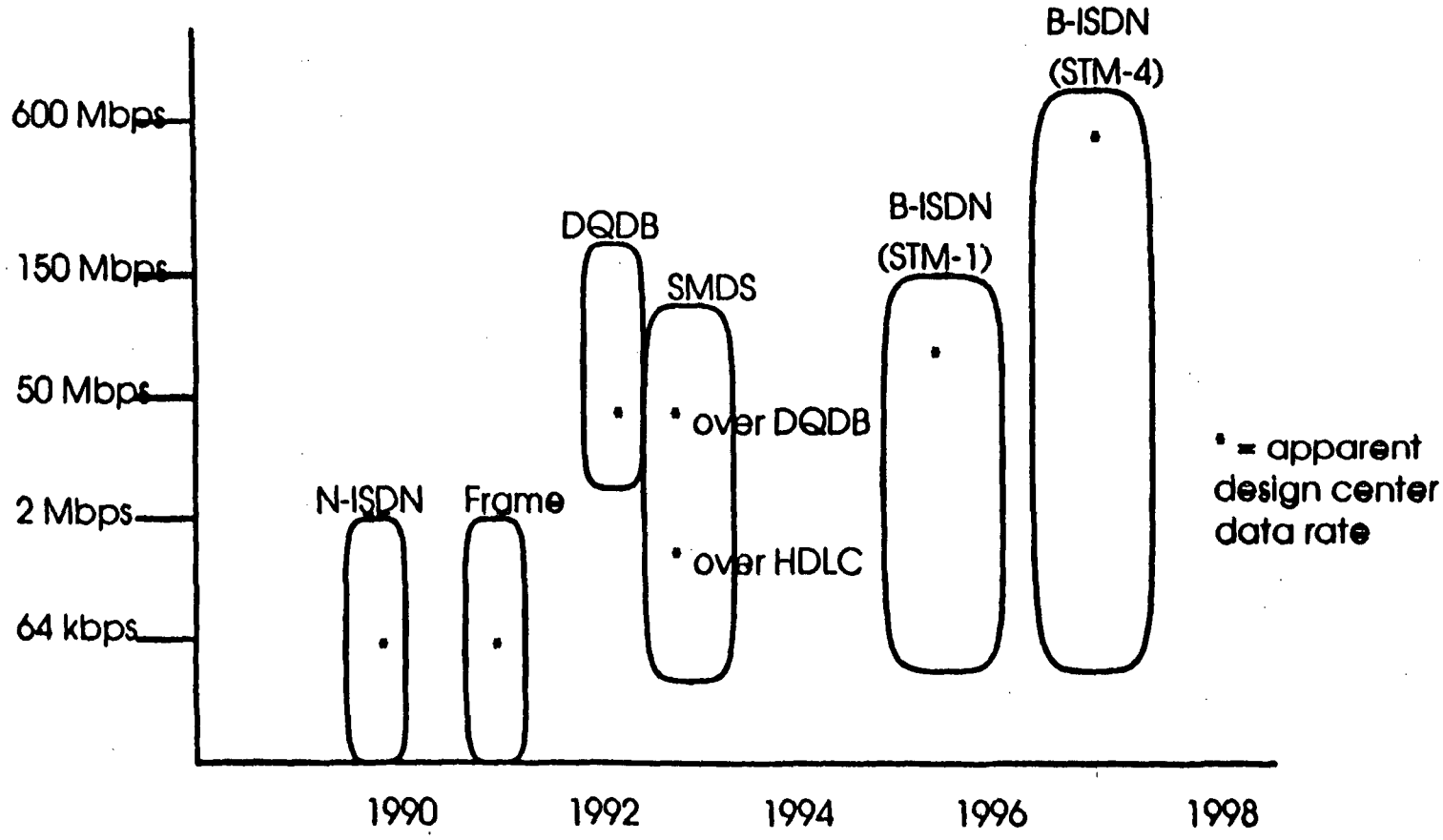
- Dual Stacks
- Hybrid Stacks
- Transport Gateway
- Applications Gateways
- Transport Layer Interfaces
- Multi–Protocol Routers

Service Based:

- Transport Service Bridge
- Portals or Tunnels

FDDI and OTHER LAN STANDARDS





Estimated time frames for commercial introduction of new public network services

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DECnet / OSI Phase V

What is DECnet / OSI Phase V?

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DECnet / OSI Phase V

- Next Generation Networking Environment for the 1990s
- Based on 15 years of DECnet experience in peer to peer networking
- One framework for Small to Large Heterogeneous Networks
- Set of Common Network Services and Applications across Digital and industry standard operating environments
- Base for Key Layered Services

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What is Digital Doing?

- Integration
- Products

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Integration

- Provide coexistence of standard and proprietary protocols
- Provide transparency of OSI and TCP/IP network to the user
- Expand network address size in anticipation of global OSI networks
- Enhance network management capabilities based on network management standards

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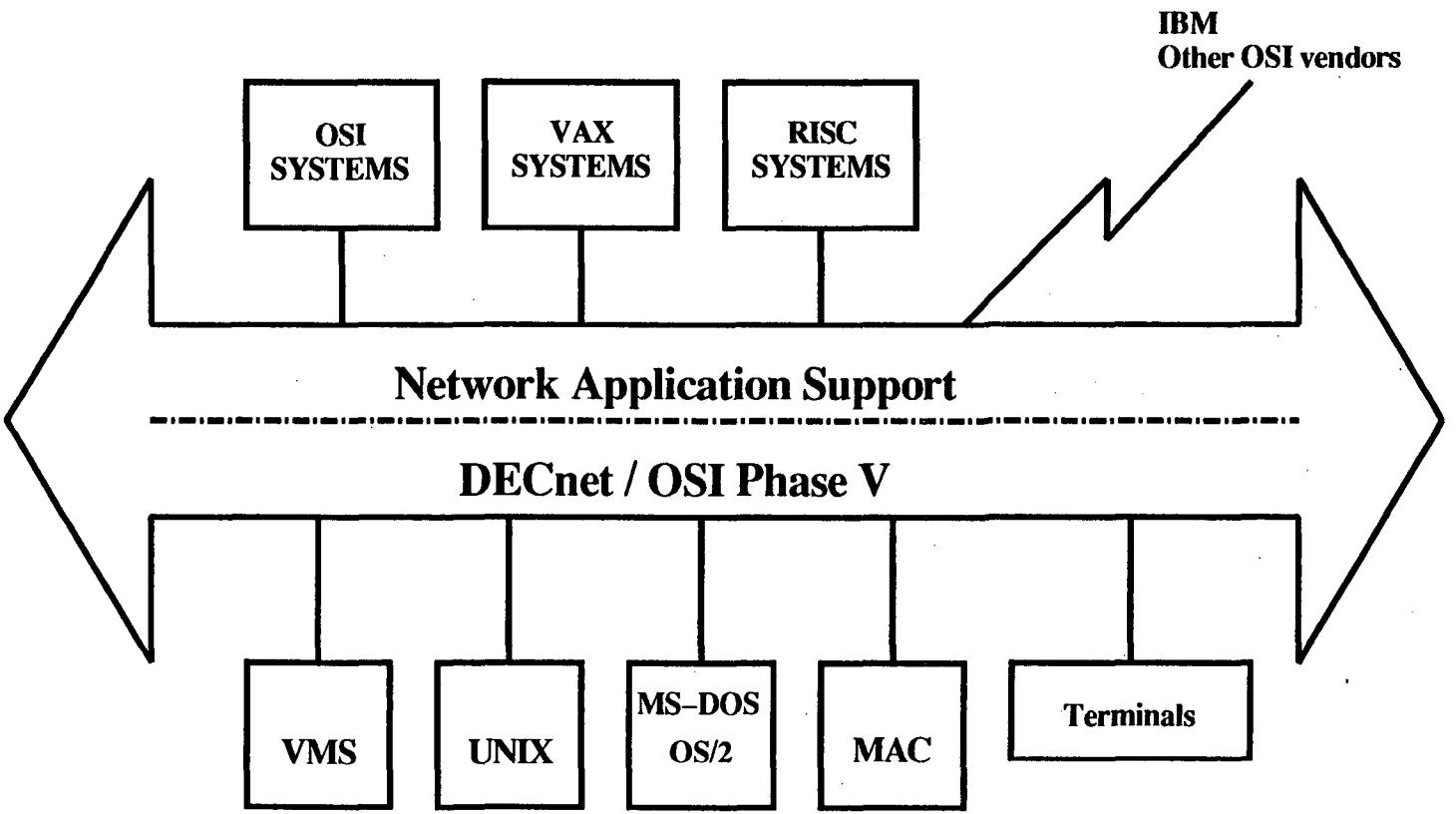
DECnet / OSI Phase V

Foundation for Network Application Support



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DECnet / OSI: Foundation for Network Application Services

Services offered:	Products:
Windowing Services	DECwindows, X Windows / Motif
Messaging Services	MAILbus™ Family, EDI, X.400
Data Access Services	SQL/Services, RDB, DBMS, VIDA for DB2, FTAM
Terminal Services	LAT, TELNET, CTERM, VTP
Directory Services	DECdns, X.500
Office Automation	All-IN-1™ Phase II, CDA VAX Notes, VTX
Forms	DECforms
Transaction Processing	DECtp
SNA Connectivity	DECnet/SNA Products

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Open Systems Networking